

EXPLANATION OF MAP SYMBOLS

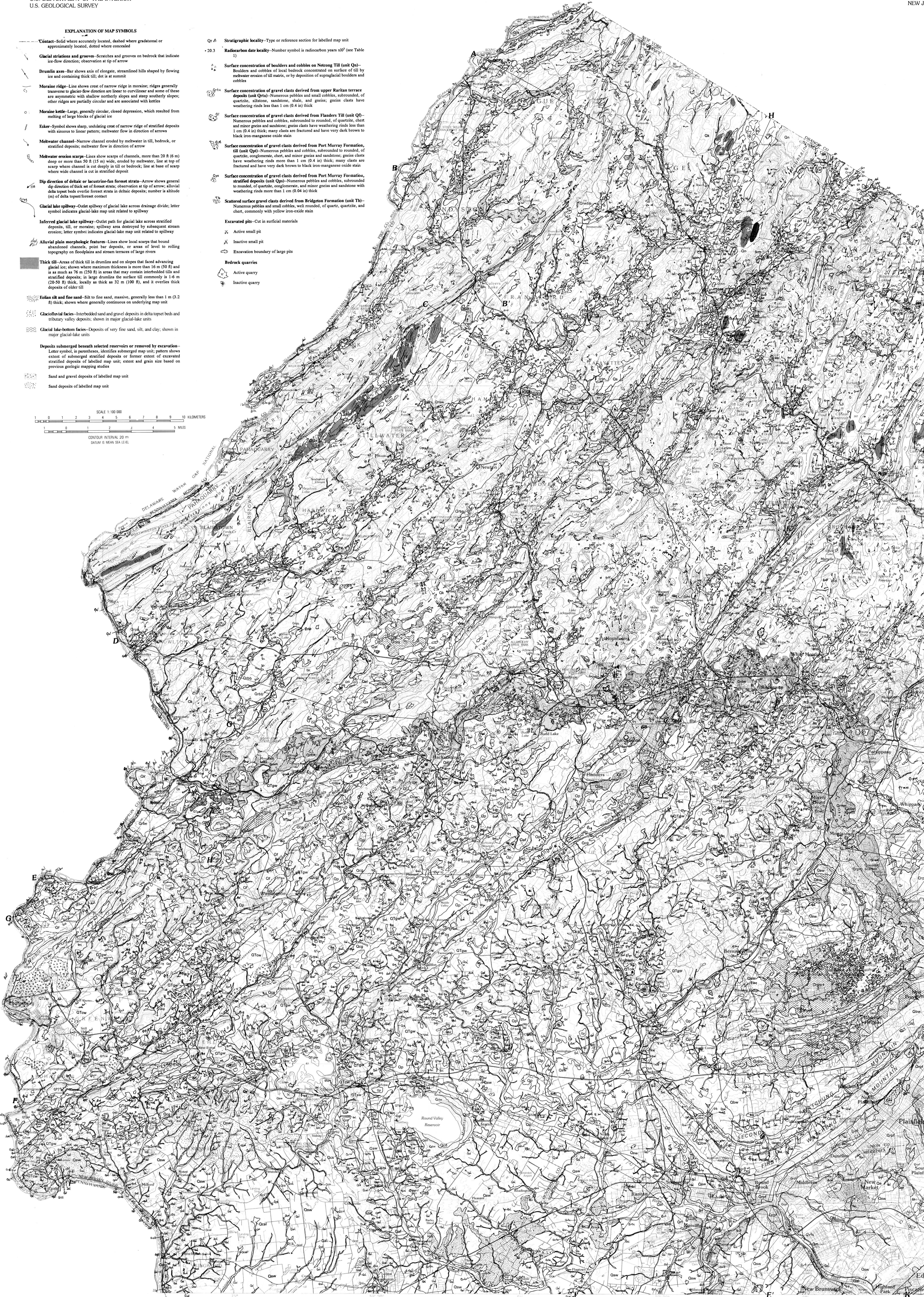
- Contact**—Solid where accurately located, dashed where gradational or approximately located, dotted where concealed
- Glacial striations and grooves**—Scratches and grooves on bedrock that indicate ice-flow direction; observation at tip of arrow
- Drumlin axes**—Bar shows axis of elongate, streamlined hills shaped by flowing ice and containing thick till; dot is at summit
- Moraine ridge**—Line shows crest of narrow ridge in moraine; ridges generally transverse to glacier-flow direction are linear to sublinear and some of these are asymmetric with shallow northerly slopes and steep southerly slopes; other ridges are partially circular and are associated with kettles
- Moraine kettle**—Large, generally circular, closed depression, which resulted from melting of large blocks of glacial ice
- Esker**—Symbol shows sharp, undulating crest of narrow ridge of stratified deposits with sinuous to linear pattern; meltwater flow in direction of arrow
- Meltwater channel**—Narrow channel eroded by meltwater in till, bedrock, or stratified deposits; meltwater flow in direction of arrow
- Meltwater erosion scarps**—Lines show scarps of channels, more than 20 ft (6 m) deep or more than 50 ft (15 m) wide, eroded by meltwater, line at top of scarp where channel is cut deeply in till or bedrock; line at base of scarp where wide channel is cut in stratified deposit
- Dip direction of deltaic or lacustrine-fan foreset strata**—Arrow shows general dip direction of thick set of foreset strata; observation at tip of arrow; alluvial delta topset beds overlie foreset strata in deltaic deposits; number is altitude (m) of delta topset/foreset contact
- Glacial lake spillway**—Outlet spillway of glacial lake across drainage divide; letter symbol indicates glacial lake map unit related to spillway
- Inferred glacial lake spillway**—Outlet path for glacial lake across stratified deposits, till, or moraine; spillway area destroyed by subsequent stream erosion; letter symbol indicates glacial-lake map unit related to spillway
- Alluvial plain morphologic features**—Lines show local scarps that bound abandoned channels, point bar deposits, or areas of level to rolling topography on floodplains and stream terraces of large rivers
- Thick till**—Areas of thick till in drumlins and on slopes that faced advancing glacial ice; shown where maximum thickness is more than 16 m (50 ft) and is as much as 76 m (250 ft) in areas that may contain interbedded tills and stratified deposits; in large drumlins the surface till commonly is 1–6 m (20–50 ft) thick, locally as thick as 32 m (100 ft), and it overlies thick deposits of older till
- Foliated silt and fine sand**—Silt to fine sand, massive, generally less than 1 m (3.2 ft) thick; shown where generally continuous on underlying map unit
- Glaciofluvial facies**—Interbedded sand and gravel deposits in delta topset beds and tributary valley deposits; shown in major glacial-lake units
- Glacial lake-bottom facies**—Deposits of very fine sand, silt, and clay; shown in major glacial-lake units
- Deposits submerged beneath selected reservoirs or removed by excavation**—Letter symbol, in parentheses, identifies submerged map unit; pattern shows extent of submerged stratified deposits or former extent of excavated stratified deposits of labelled map unit; extent and grain size based on previous geologic mapping studies
- Sand and gravel deposits of labelled map unit**
- Sand deposits of labelled map unit**

- Stratigraphic locality**—Type or reference section for labelled map unit
- Radiocarbon date locality**—Number symbol is radiocarbon years AD (see Table 1)
- Surface concentration of boulders and cobbles on Netcong Till (unit Qn)**—Boulders and cobbles of local bedrock concentrated on surface of till by meltwater erosion of till matrix, or by deposition of supraglacial boulders and cobbles
- Surface concentration of gravel clasts derived from upper Raritan terrace deposits (unit Qrtu)**—Numerous pebbles and small cobbles, subrounded, of quartzite, siltstone, sandstone, shale, and gneiss; gneiss clasts have weathering rinds less than 1 cm (0.4 in) thick
- Surface concentration of gravel clasts derived from Flanders Till (unit Qf)**—Numerous pebbles and cobbles, subrounded to rounded, of quartzite, chert and minor gneiss and sandstone; gneiss clasts have weathering rinds less than 1 cm (0.4 in) thick; many clasts are fractured and have very dark brown to black iron-manganese oxide stain
- Surface concentration of gravel clasts derived from Port Murray Formation, till (unit Qpt)**—Numerous pebbles and cobbles, subrounded to rounded, of quartzite, conglomerate, chert, and minor gneiss and sandstone; gneiss clasts have weathering rinds more than 1 cm (0.4 in) thick; many clasts are fractured and have very dark brown to black iron-manganese oxide stain
- Surface concentration of gravel clasts derived from Port Murray Formation, stratified deposits (unit Qps)**—Numerous pebbles and cobbles, subrounded to rounded, of quartzite, conglomerate, and minor gneiss and sandstone with weathering rinds more than 1 cm (0.4 in) thick
- Scattered surface gravel clasts derived from Bridgeton Formation (unit Tb)**—Numerous pebbles and small cobbles, well rounded, of quartzite, and chert, commonly with yellow iron-oxide stain
- Excavated pits**—Cut in surficial materials
- Active small pit**
- Inactive small pit**
- Excavation boundary of large pits**
- Bedrock quarries**
- Active quarry**
- Inactive quarry**

SCALE 1:100,000

1 0 1 2 3 4 5 6 7 8 9 10 KILOMETERS
1 0 1 2 3 4 5 MILES

CONTOUR INTERVAL 20 m
DATUM IS MEAN SEA LEVEL



Base from U.S. Geological Survey
Allentown, 1984; Bridgeport, 1986;
Long Island West, 1984; Middletown,
1986; Newark, 1986; Scranton, 1986

SURFICIAL GEOLOGIC MAP OF THE NORTHERN SHEET, N

By

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1995